

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

*Part A2*

1. An isolated nucleic acid molecule encoding a secoisolariciresinol dehydrogenase protein.
2. A nucleic acid molecule of Claim 1 encoding a gymnosperm secoisolariciresinol dehydrogenase protein.
3. A nucleic acid molecule of Claim 2 encoding a secoisolariciresinol dehydrogenase protein from a genus selected from the group consisting of *Podocarpus*, *Tsuga*, *Pinus*, *Thuja*, *Araucaria*, *Juniperus* and *Taiwania*.
4. A nucleic acid molecule of Claim 1 encoding an angiosperm secoisolariciresinol dehydrogenase protein.
5. A nucleic acid molecule of Claim 4 encoding a secoisolariciresinol dehydrogenase protein from a genus selected from the group consisting of *Virola*, *Piper*, *Arctium*, *Podophyllum* and *Linum*.
6. A nucleic acid molecule of Claim 1 encoding a secoisolariciresinol dehydrogenase protein from a *Forsythia* species.
7. A nucleic acid molecule of Claim 6 encoding a secoisolariciresinol dehydrogenase protein from *Forsythia intermedia*.
8. A nucleic acid molecule of Claim 7 encoding a secoisolariciresinol dehydrogenase protein having the amino acid sequence of any one of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8 and SEQ ID NO:10.
9. A nucleic acid molecule of Claim 7 having the nucleic acid sequence of any one of SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7 and SEQ ID NO:9.

*Part A3*

10. An isolated nucleic acid molecule that hybridizes under stringent conditions to a fragment of any one of the nucleic acid molecules set forth in SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7 and SEQ ID NO:9, said fragment having a length of at least 15 bases.

11. An isolated recombinant secoisolariciresinol dehydrogenase protein.

12. An isolated recombinant gymnosperm secoisolariciresinol dehydrogenase protein of Claim 11.

13. An isolated recombinant gymnosperm secoisolariciresinol dehydrogenase protein of Claim 12, said protein occurring naturally in a gymnosperm genus selected from the group consisting of *Podocarpus*, *Tsuga*, *Pinus*, *Thuja*, *Araucaria*, *Juniperus* and *Taiwania*.

14. An isolated recombinant angiosperm secoisolariciresinol dehydrogenase protein of Claim 11.

15. An isolated recombinant angiosperm secoisolariciresinol dehydrogenase protein of Claim 14, said protein occurring naturally in an angiosperm genus selected from the group consisting of *Virola*, *Piper*, *Arctium*, *Podophyllum* and *Linum*.

16. An isolated recombinant *Forsythia* secoisolariciresinol dehydrogenase protein of Claim 11.

17. An isolated recombinant *Forsythia* secoisolariciresinol dehydrogenase protein of Claim 11, said protein having the amino acid sequence of any one of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8 and SEQ ID NO:10.

18. A replicable expression vector comprising a nucleic acid sequence encoding secoisolariciresinol dehydrogenase. *Sub C4*

19. A replicable expression vector of Claim 18 comprising a nucleic acid sequence encoding secoisolariciresinol dehydrogenase from a genus selected from the group consisting of *Podocarpus*, *Tsuga*, *Pinus*, *Thuja*, *Araucaria*, *Juniperus*, *Taiwania*, *Virola*, *Piper*, *Arctium*, *Podophyllum* and *Linum*.

20. A replicable expression vector of Claim 18 comprising a nucleic acid sequence encoding secoisolariciresinol dehydrogenase having the biological activity of a protein having the amino acid sequence of any one of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8 and SEQ ID NO:10.

21. A host cell comprising a vector of any one of Claim 18, Claim 19 or Claim 20.

22. A method of enhancing the expression of secoisolariciresinol dehydrogenase protein in a suitable host cell comprising introducing into the host cell an expression vector that comprises a nucleotide sequence encoding a protein having the biological activity of a secoisolariciresinol dehydrogenase protein having the amino acid sequence set forth in any one of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8 and SEQ ID NO:10.

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23. A method of modifying the expression of secoisolariciresinol dehydrogenase protein in a suitable host cell comprising introducing into the host cell an expression vector that comprises a nucleotide sequence that expresses an RNA that hybridizes under stringent conditions to all or part of the nucleic acid molecule having the nucleic acid sequence set forth in SEQ ID NO:1.